Greening of Whole Tax System and Carbon Tax in Japan

Environment and Economy Division

Ministry of the Environment

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Environment-related Tax in Japan

What is “the Greening of the Whole Tax System”?

In **“the Greening of the Whole Tax System”, a tax is to be designed in accordance with the environmental impact** to **make economic incentives work towards the suppression of the environmental load** from the perspective of **building a sustainable society**.

Source: Committee for the Promotion of Greening the Whole Tax System(2012), *Interim Compilation of Preceding Discussions on the Promotion of Greening the Whole Tax System (September 4, 2012)*, Ministry of the Environment, Tokyo.

“The Greening of the Whole Tax System” in the Act

Basic Environment Act (Law No. 91 on November 19, 1993)

(Economic Instruments to Prevent Impediment on Environmental Conservation)

Article 22.

Paragraph 2. The National Government should appropriately investigate and research for effects on prevention of impediment on environmental conservation and on national economy in case of implementing economic instruments, considering that **the instruments, with purpose to incentivize a person, who makes actions to produce environmental burden, to lower the burden, by imposing him/her appropriate and fair economic burden**, are expected to make effects to prevention of impediment on environmental conservation and recommended internationally, and should make an effort to gain people’s understanding and cooperation about that policies related to the instruments are utilized to prevent impediment on environment conservation, in case of implementing the instruments. In this case, when the instruments are related to policies for global environment conservation, the National Government should consider international coordination, in order to secure effects of the instruments appropriately.

“The Greening of the Whole Tax System” in the Cabinet Decision

The 4th Environment Basic Plan (Cabinet Decision on April 27, 2012)

Part 2 Concrete Development of Future Environmental Policy
Chapter 1 Development of Environmental Policy in each Prioritized Area

Section 1 Promotion of Greening Economy and Society and Green Innovation
[Economic Incentives]

① Provision of Economic Incentives from the Viewpoint of Environment

Economic instruments, based on market mechanisms, are to aim at promoting every economic player to choose environmentally-friendly action in production and choice of merchandise through economic incentives. Economic instruments are considered by several institutes, and introduced or put under trials by central and local governments. Introducing the instruments, it is important to minimize national people's burden and administrative/fiscal cost, with maximizing their effect under the concept of policy-mix. As for fiscal assistance, the budget should be utilized efficiently, considering their cost and benefit. **As for tax system, the government promotes greening of the whole tax system, through synthetic and systematic survey and analysis of environmental and other effects from environment-related taxes including energy tax and vehicle tax, with considering situation of foreign countries**.

Section 4 Initiatives about Global Warming

⑧ Consideration and Promotion of Cross-sectional Countermeasures and Initiatives

A. Greening of the Tax Scheme

Promotion of greening environment-related taxes including energy taxes and vehicle taxes is an important initiative for global warming countermeasures, such as promotion of low-carbonization.

The special tax measure on the Petroleum and Coal Tax rate for climate change mitigation, which is to be effective from October 2012, is to add the additional tax rate according to each fossil fuel's CO2 emission on the current Petroleum and Coal Tax covering whole fossil fuel, in order to strengthen the global warming countermeasures with tax, and to implement programs to control energy-originated CO2 emission. Furthermore, utilizing its tax revenue, the government will implement energy-efficiency measures, expansion of renewable energy, and promotion of clean fossil fuel and its efficient use.

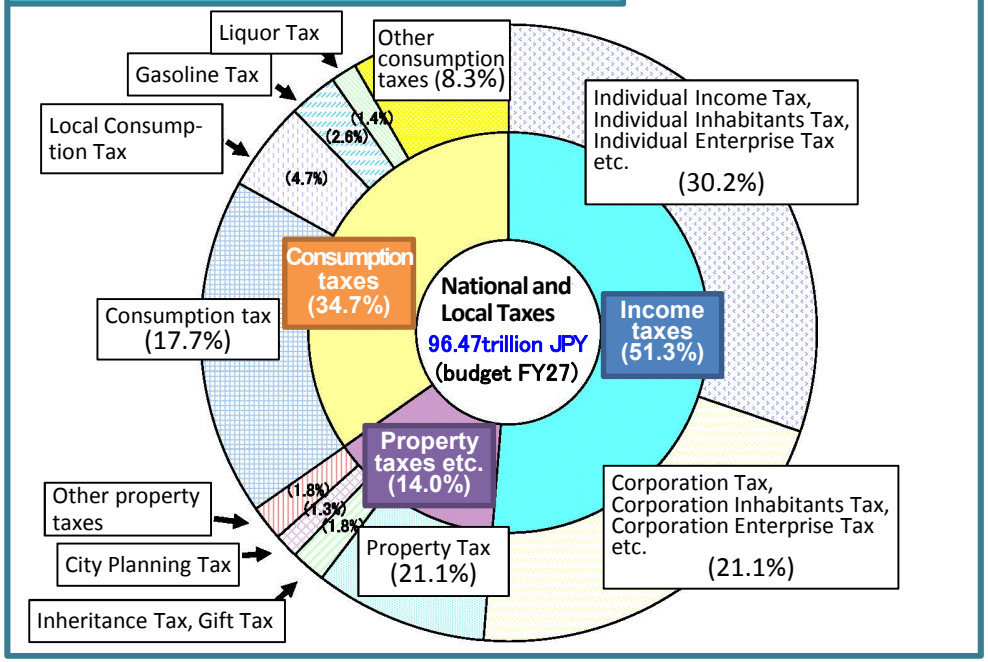
The government promotes greening of the whole tax system, through synthetic and systematic survey and analysis of environmental and other effects from environment-related taxes including energy taxes and vehicle taxes, with considering situation of foreign countries.

Summary of Tax System in Japan

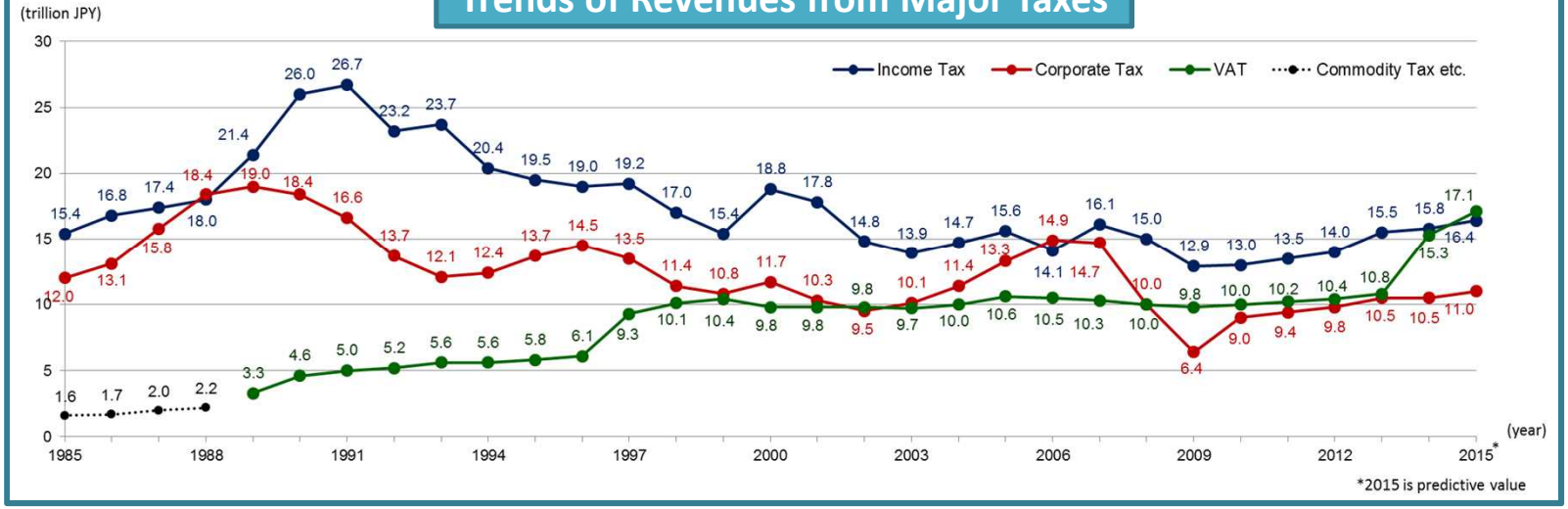
Items of National/Local Tax

	National	Local		National	Local
Tax on Income	Income Tax Corporate Tax Special Local Corporate Tax Special Income Tax for Re-construction Special Local Corporate Tax	Individual Habitant Tax Individual Enterprise Tax Corporate Habitant Tax Corporate Enterprise Tax	Tax on Consumption	Consumption Tax Liquor Tax Tabaco Tax Special Tabaco Tax Gasoline Tax Local Gasoline Tax Oil and Gas Tax Vehicle Weight Tax Aviation Fuel Tax Petroleum and Coal Tax Electric Power Development Promotion Tax Tariff Tonnage Tax Special Tonnage Tax	Local Consumption Tax Local Tabaco Tax Diesel Oil Delivery Tax Automobile Acquisition Tax Golf Course Use Tax Bathing Tax Automobile Tax Light Vehicle Tax Mineral Mining Tax Hunting Tax Mining Area Tax
Tax on Assets, etc.	Inheritance Tax Gift Tax Registration and License tax Stamp Tax	Real Estate Acquisition Tax Fixed Asset Tax Urban Plan Tax Office Tax Special Land Owner Tax			

Breakdown of Tax Revenue



Trends of Revenues from Major Taxes



Source: Ministry of Finance. "Items and Breakdown of National/Local Tax" https://www.mof.go.jp/tax_policy/summary/condition/001.htm
Ministry of Finance. "Trends of Revenues from Major Taxes" https://www.mof.go.jp/tax_policy/summary/condition/011.htm

Environment-related Taxes in Japan

	Tax Items (Sovereign of Tax)	Taxable Objects	Tax Rates	Tax Revenue (FY2015)(JPY)	Revenue Spent for
Energy Tax	**Gasoline Tax** (Nation)	**Gasoline;** transferred from plants, or delivered from bonded areas.	**JPY 48.6**/ℓ (Permanent: JPY 24.3/ℓ)	2,466 bill.	General budget
	Local Gasoline Tax (Nation)		**JPY 5.2**/ℓ (Permanent: JPY 4.4/ℓ)	263.8 bill.	General budget (100% distributed to prefectures)
	Oil and Gas Tax (Nation)	**Oil and Gas for Vehicles;** transferred from stations, or delivered from bonded areas.	**JPY 17.5**/kg	20 bill.	General budget (50% distributed to prefectures)
	Diesel Oil Delivery Tax (Prefectures)	**Diesel Oil;** delivered by traders with accompanying actual delivery of the oil.	**JPY 32.1**/ℓ (Permanent: JPY 15.0/ℓ)	938.3 bill	General budget
	Aviation Fuel Tax (Nation)	**Aviation Fuel;** loaded to aviation.	**JPY 18.0**/ℓ ※Special rate until Mar. 2019 (Permanent: JPY 26.0/ℓ)	65.6 bill.	Public works for airports (2/9 is distributed to prefectures and municipalities relevant for airports)
	Petroleum and Coal Tax (Nation)	**Petroleum,/oil products, Gaseous Hydrocarbon, and Coal;** transferred from the field, or delivered from bonded areas.	• Pet/oil products **JPY 2,040**/kℓ • LPG、LNG, etc. **JPY 1,080**/t • Coal **JPY 700**/t	628 bill.	Policies for stable fuel supply (Development of oil and natural gas, and establishment of reserves, to ensure stable and low-cost supply of fossil fuel) Policies for modernization of the energy demand/supply structure (Measures for energy-efficiency and new energy, and control measures for energy-originated CO2 emission, to establish a stable and appropriate energy structure, adapted with state of econ & env.
	Tax for Climate Change Mitigation	Additional rate corresponding to CO_2 emission ※Effective from Oct. 2012.	• Pet/oil products **JPY 760**/kℓ • LPG、LNG, etc. **JPY 780**/t • Coal **JPY 670**/t	—	
	Electric Power Development Promotion Tax (Nation)	**Sold Electricity;** delivered by general electric enterprises.	**JPY 375/1000kwh**	323 bill.	Policy measures for where power plants are located (Supply of grant under the Act on Development of Region Surrounding Power Generation Facilities, fiscal support for safety measures in the region, and other fiscal support for establishment and smooth operation of facilities for power generation) Policy measures for utilization of power sources (Fiscal support for utilization and security of power generation facilities, and for smooth supply of electricity from power plants) Measures for nuclear safety regulation (Measures to ensure safety of nuclear power station (includes supply of grant to the JNES)
				Total. 4,704.7 bill.	
Vehicle Tax	**Motor Vehicle Weight Tax** (Nation)	**Automobile;** when issuance of certification for the automobile inspection, and of designated car number (light vehicle)	[Ex.]Passenger car Per 0.5t of vehicle weight; • Home use **JPY 4,100**/year • Business **JPY 2,600**/year (Permanent: JPY 2,500 for both)	630.7 bill.	General budget (407/1000 distributed to municipalities) Part of the revenue is allocated for compensation to victims of public pollution.
	Automobile Tax (Prefectures)	**Automobile;** owned on April 1	[Ex.]Passenger, home use 1.500～2,000cc **JPY 39,500**/year	1,539.7 bill.	General budget
	Light Vehicle Tax (Municipalities)	**Light vehicle or motorcycle;** owned on April 1	[Ex.]Light vehicle, home use • From FY2015 **JPY 10,800**/year (Before FY2015 JPY 7,200/year)	199.9 bill.	General budget
	Automobile Acquisition Tax (Prefectures)	**Automobile;** when acquired.	• Home use **3%** of car price • Business, **2%** of car price (Permanent: 3% for both)	109.6 bill.	General budget (95/100×7/10 ia distributed to municipalities)
				Total. 2,479.9 bill.	

Environment-related Special Tax Measures in Japan

Sustainable Society

Recycling Society

◇**Appropriate Waste Disposal**
- Exemption or relief of Business Office Tax on waste disposal facilities
- Relief of Property Tax on waste disposal facilities and general waste landfill sites
- Exemption of Diesel Oil Delivery Tax for waste disposal business, etc.

Harmony with Nature Society

◇**Conservation of Biodiversity**
- Exemption of Property Tax on national parks
- Special tax treatment on transfer of land in national parks
- Special treatment of Inheritance Tax in case of inheritance of land in special preservation areas of national parks, etc.

Low Carbon Society

◇**Tax for Climate Change Mitigation**

Special addition of tax on Petroleum and Coal Tax according to CO_2 emission

◇**Greening of Vehicle Taxes**

For eco-friendly vehicles,
- Revision of Motor Vehicle Weight Tax (Eco-Car Tax Reduction)
- Reduction of Automobile Acquisition Tax (Eco-Car Tax Incentive)
- Greening of Vehicle Tax

◇**Promotion of Renewables**
- Relief of Property Tax on renewable power generation facilities

◇**Energy Saving Houses**
- Investment tax relief on newly-built energy saving houses (Special deduction of Income Tax)
- Relief of Real Estate Acquisition Tax and Property Tax on Special Certified Long-term High Quality Houses
- Relief of Property Tax on houses renovated for energy saving

◇**Promotion of Environment-related investment**
- Investment tax relief on environment-related investment (Special depreciation of Corporate Tax, etc.)

◇**Biofuel**
- Special treatment of Gasoline Tax on gasoline mixed with bioethanol

Security Secured Society

◇**Realization of Low Public Pollution Society**
- Relief of Business Office Tax on public pollution prevention facilities
- Relief of Property Tax on public pollution prevention facilities

◇**Restoration and Reconstruction from East-Japan Great Earthquake**
- Special treatment of Income Tax to promote establishment of disposal facilities for polluted wastes, etc.

※ Special deduction of Corporate Tax to promote environment-related R&D is also included.

Carbon Tax in Japan
—"Tax for Climate Change Mitigation"—

Tax Reform Process in Japan

	Administration	Coalition Parties	Diet	(Ref.) Budget
Apr. | Aug.	■ Ministries consider tax reform requests. ↓ ■ **Ministries submit the requests to MOF and MIC.**	● Sectional meetings approve ministries' submission of the requests.		□ Ministries consider budget requests ↓ □ **Ministries submit the requests to MOF.**
Sep. | Dec.	■ Negotiation with tax authorities of MOF/MIC ↓ ■ Cabinet Decision of Outline of Tax Reform (After coalition parties' decision)	● Sectional meetings' hearings from relevant organizations ● Sectional meetings' submission of the requests to Tax Commission ● Tax Commission's hearing from sectional meetings ↓ ● **Intensive discussion in Tax Commission (every day from late November)** ● **Coalition Parties' Outline of Tax Reform (early in December)**		□ Negotiation with budget authority (MOF) ↓ □ **Cabinet Decision of Draft Budget (late December)**
Jan. | Mar.			◆ Submission of Tax Reform Bill(late Jan.) ↓ ◆ **The bill passes the Diet.(late March)**	□ Submission of Draft Budget (late Jan.) ↓ □ **The draft passes the Diet (late March)**
Apr. |	**Implementation of the tax reform**			**Execution**

Carbon Tax in the Outline of the Tax Reform

FY2005 Outline of the Tax Reform (LDP and Komeito, December 15, 2004)

We consume much fossil fuel whose amount is incomparable with the past, and enjoy rich and convenient life. On the other hand, we emit much amount of CO2, and leave the negative legacy; global warming, to the future generation. Addressing this issue, and based on the enforcement of the Kyoto Protocol in February 2005 and accompanied responsibility of Japan, it is important to cope with both environment and economy, taking into consideration assessment and revision of the Global Warming Countermeasures Initiatives. To do that, following the result of synthetic consideration of every policy option, **we consider desirable design of so-called environmental tax, if necessary, as soon as possible.**

FY2012 Outline of the Tax Reform (Cabinet Decision, December 10, 2011)

① Introduction of Tax for Climate Change Mitigation

Reduction of GHG emission to stop global warming is an important and urgent issue for Japan and global society. European countries have strengthened tax imposed on CO2 emission sources including fuels since the 1990s, and implemented the CO2 control measures with market mechanism, and support for introduction of energy efficient facilities.

In Japan, 90% of GHG emissions is from energy-originated CO2. It is indispensable to strengthen measures to control energy-originated CO2, including energy-efficiency measures, diffusion of renewable energy, and use of cleaner fossil fuel.

Considering this situation, **from the viewpoint that Japan also strengthens global warming countermeasures with tax, and implements every policy measure to control energy-originated CO2 emission,** "Tax for Climate Change Mitigation" was stipulated in the FY2011 Tax Reform. But it was suspended as a result of deliberation in the Diet. This tax reform **is to be materialized** in the FY2012 Tax reform, from the viewpoint that global warming countermeasures as an important and urgent issue at the global level are to be implemented. Concretely, **in order to control energy-originated CO2 over various sectors, we will establish "Special Tax Measure for Climate Change Mitigation" which adds tax rates in accordance with CO2 emission to the existing Petroleum and Coal Tax, which covers all fossil fuels.** The additional tax rates are: JPY 760/kL for oil and oil products, JPY 780/t for gaseous hydrocarbons, and JPY 670/t for coal.

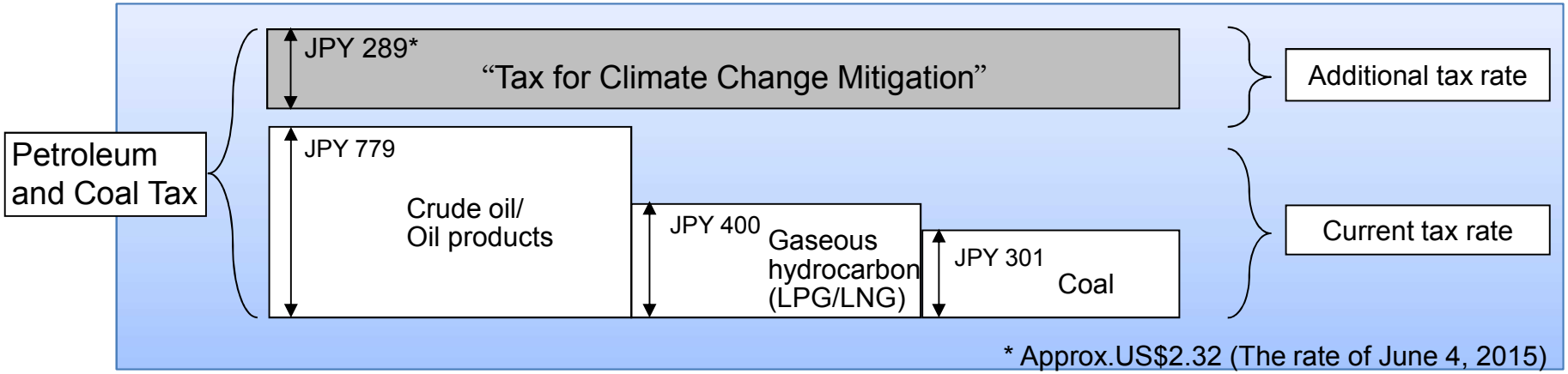
Such a "broad and thin" burden avoids excessive burden on specific sectors and industries, and ensures fairness of tax impose. And, introducing this measure, in order to avoid sharp increase of burden, the tax rate will be increased step by step, and tax exemptions/rebates will be introduced in certain sectors. In addition, we will also implement measures to reduce production/delivery cost of fuel, to secure stable supply, to improve energy efficiency of logistics/transportation, and to support underpopulated/cold regions.

Overview: Tax for Climate Change Mitigation

- Tax rate corresponding to the amount of CO_2 emissions for all fossil fuels (JPY 289/t-CO_2)
- Enforced from Oct. 2012 and increases in the tax rate gradually over 3 and a half years
- All the tax revenue will be allocated for curbing energy-originated CO_2 emissions

Tax Rate

Tax Rate per t-CO_2 of "Tax for Climate Change Mitigation"



Enforcement Stage

Taxable Objects	Current Tax Rate	From Oct. 1, 2012	From Apr. 1, 2014	From Apr. 1, 2016
Crude oil/Oil products [per 1 kl]	(JPY 2,040)	+ JPY 250	+ JPY 250	+ JPY 260
		(JPY 2,290)	(JPY 2,540)	(JPY 2,800)
Gaseous hydrocarbon [per 1 t]	(JPY 1,080)	+ JPY 260	+ JPY 260	+ JPY 260
		(JPY 1,340)	(JPY 1,600)	(JPY 1,860)
Coal [per 1 t]	(JPY 700)	+ JPY 220	+ JPY 220	+ JPY 230
		(JPY 920)	(JPY 1,140)	(JPY 1,370)

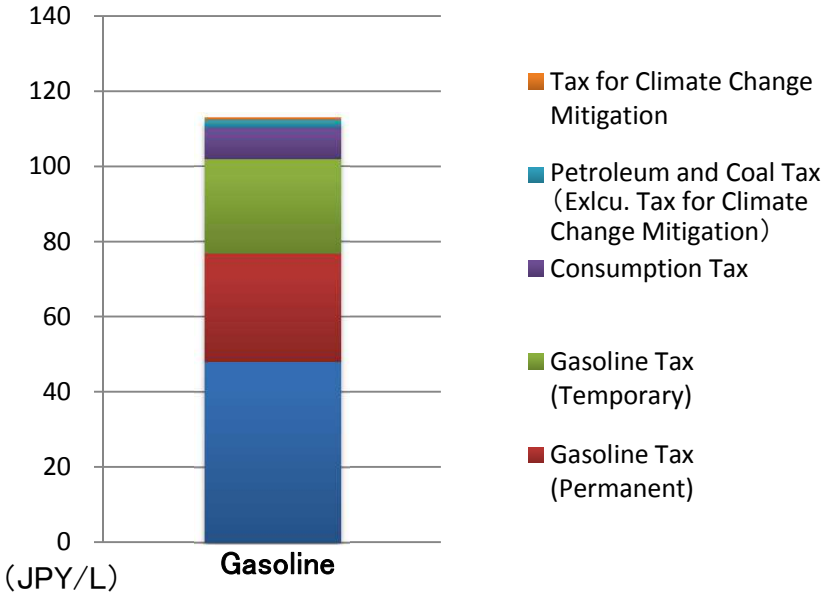
Tax Revenue

[1st year] **JPY 39 billion** ; [Normal year] **JPY 260 billion**

To be used for introduction of renewable energy and enhancement of energy conservation measures, etc.

Carbon Tax's Impact on Gas and Electricity Price (JPY289/t-CO2)

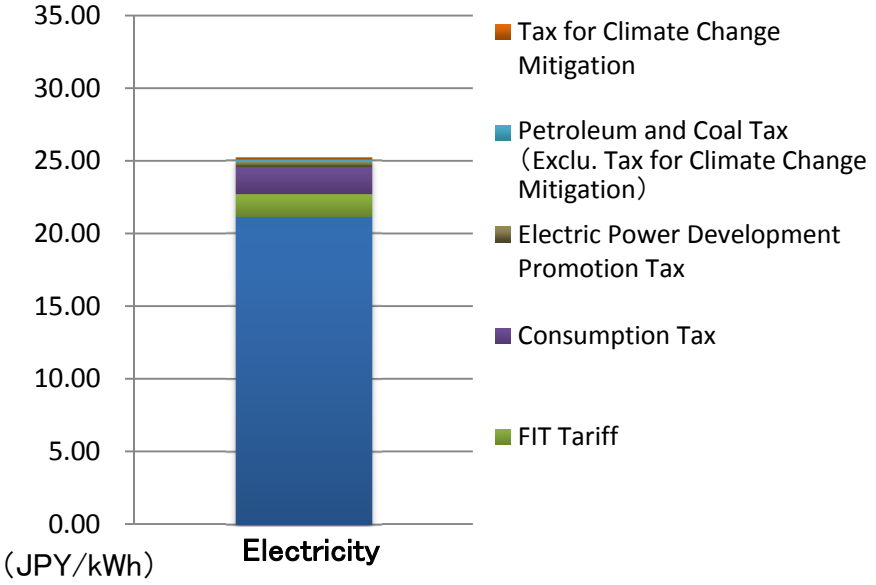
Gasoline Price



Tax Items, etc.		Added Price (JPY/L)
(Taxes on Energy, etc.)	Tax for Climate Change Mitigation(※1)	0.76
	Petroleum and Coal Tax (Exclu. Tax for Climate Change Mitigation)	2.04
	Consumption Tax	8.38
	Gasoline Tax (Temporary)	25.10
	Gasoline Tax (Permanent)	28.70
Others (Cost price, labor cost, etc.)		48.14
Total Price(※2)		113.12

(※1) Tax rate since April 2016
(※2) IEE Japan, "Price information: General sales price (Average on Feb. 2016)"

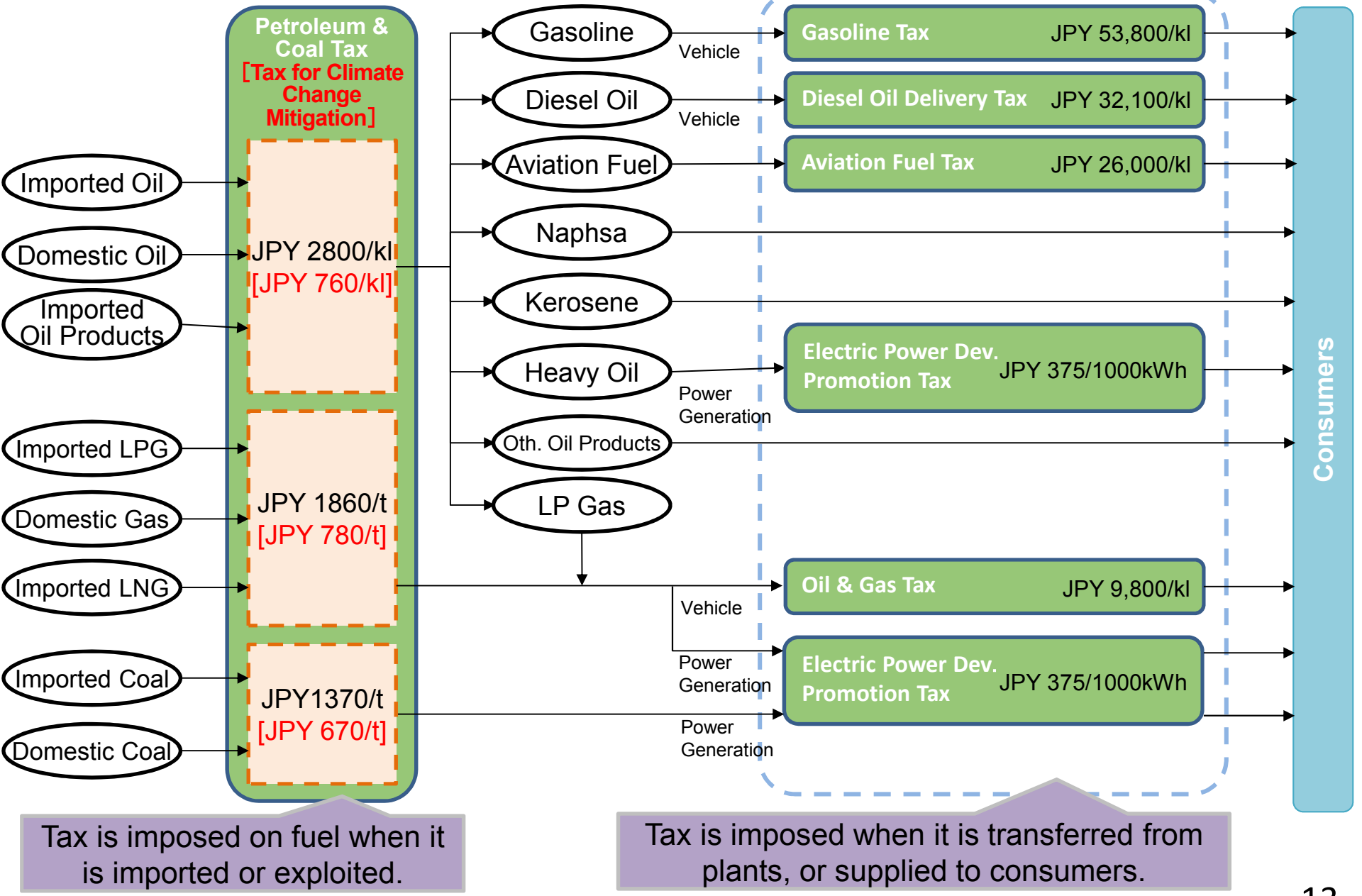
Electricity Price



Tax Items, etc.		Added Price (JPY/kWh)
(Taxes on Energy, etc.)	Tax for Climate Change Mitigation (※1)	0.11
	Petroleum and Coal Tax (Exclu. Tax for Climate Change Mitigation)	0.145
	Electric Power Development Promotion Tax	0.375
	Consumption Tax	1.87
(Tariff, etc.)	FIT Tariff	1.58
	Adjusted to Fuel Price (※3)	−2.30
Others (Cost price, labor cost, etc.)		23.45
Total Price(※2)		25.22

(※1) Tax rate since April 2016
(※2) TEPCO, "Notice on Fuel Price Adjustment for Mar. 2016" (Average case)
(※3) In the bar chart, this part is added to "Others (cost price, etc.)"

Overview of Energy-related Taxes



Notes: Tax rates of Petroleum and Coal Tax and Tax for Climate Change Mitigation are from April 2016.

Structure of the Special Account for Energy Measures (Energy Demand/Supply Section)

※Draft Budget for FY2016

General Account

Oil

LPG

LNG

Coal

Petroleum & Coal Tax: JPY 688 billion

[Tax for Climate Change Mitigation: JPY 262.3 billion (From FY2016)]

Petroleum & Coal Tax: Imposed

When imported

Check By MOF

Special Account for Energy Measures (Energy Demand/Supply Section): JPY 806.2 billion

Transfer from General Budget: JPY 596.7 bill.

Surplus, etc.(※): JPY 209.5 bill.

Rev.

Exp.

Modernization of Energy Demand/Supply Structure JPY 524.1bill.

【MOE】 JPY 155.8 bill.

【METI】 JPY 367.7 bill.

Stable Supply of Fuel (METI) JPY 282.1 bill.

【Local Govt.】

Program to Strengthen Carbon Management of Local Government, etc.

【Cooperation】

MLIT

MOE

MOFA

※ Surplus, etc. includes surplus and miscellaneous revenues.

MOE's Programs (Examples)

- Program to Promote Self-supported Diffusion of Renewable Electricity/Heat
- Program to Promote Diffusion of Energy-efficient Natural Refrigerant-using Equipment
- Program to Promote CO2-efficient Buildings for Business Use
- Program to Promote Hydrogen Society Utilizing Renewable Energy
- Program of Regional Low-Carbon Investment Promotion Fund
- JCM Financial Support Program

Analysis on Tax for Climate Change Mitigation's Effect for CO2 Reduction and Japan's Economy

CO2 Reduction Effect of Tax for Climate Change Mitigation

○ Energy-originated CO2 reduction effect (the sum of price effect and revenue effect) is estimated as **▲0.5%～▲2.2% to the 1990 level（6 million ～24 million t-CO_2）by 2020**.

Estimated CO2 Reduction Effect of Tax for Climate Change Mitigation(＊)

	2020
Price Effect	▲0．2% （1.76 million t-CO2）
Budget Effect	▲0．4%～▲2．1% （3.93 million～21.75 million t-CO2）
Total	**▲0．5%～▲2．2% （5.69 million～23.50 million t-CO2）**

＊ Based on FY2012 Tax Reform
- Tax rate ： JPY 289/t-CO2（Reaches over 3 and a half years）
- Revenue ： 39.1 billion(FY2012) ／ 262.3 billion (FY2016-)

Notes: Energy-originated CO2 emission in 2020 (No tax case) is estimated as 1,115 million t-CO2.
Price effect is calculated with the price elasticity of energy consumption, estimated from the updated statistical data.
Revenue effect is calculated with the AIM Technology Model of the National Institute for Environmental Studies. One case scenario is that existing technologies with better benefit to cost are preferably introduced. The other is that a half of revenue is used to long-term measures, and that another half is distributed to existing technologies in accordance with their potential of introduction.
Announcement effect is not calculated in this estimation.

〔 Source: Mizuho Information & Research Institute (2012) 〕

Analysis of Price Effect: Estimation from Price Elasticity

○ The sectoral multinomial distribution lag model is applied for analysis of price effect. With the formula to explain energy consumption from real GDP and energy price, we estimate variation of energy consumption accompanied with price variation of energy.

$$\ln(\mathrm{E}_t) = \alpha + \beta \ln(GDP_t) + \sum_{i=t-T}^{T} \gamma_i \ln(PRICE_i) + u_t$$

E_t : Energy consumption at term t.

GDP_t : Real GDP at term t.

$PRICE_t$: Real average energy price at term t.

u_t : Error term　α : Constant　β : Income elasticity

γ_i : Price elasticity in the i^{th} lag year　($i = t\text{-}T, \ldots, t$: Max lag year is Year T)

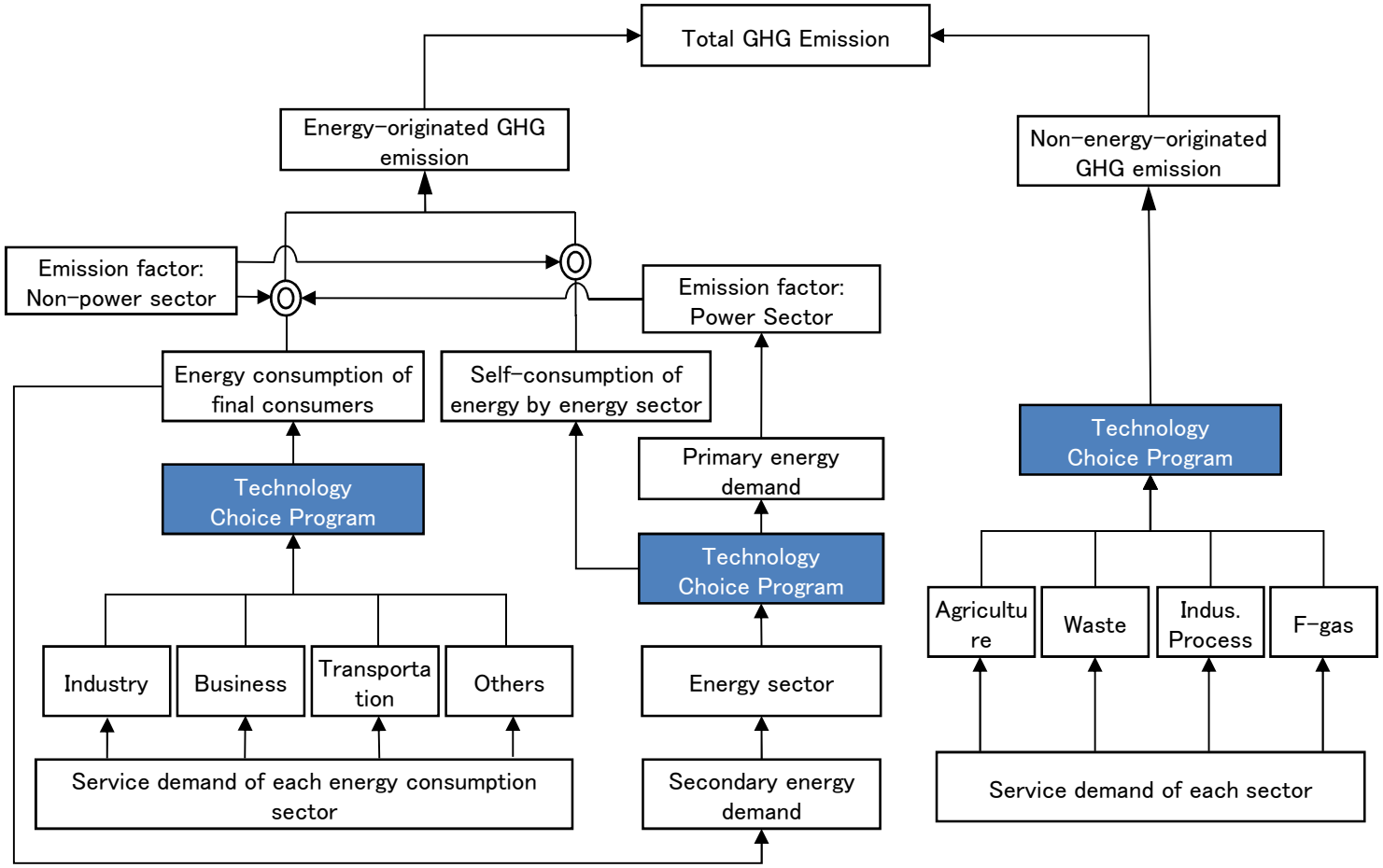
$\gamma_t \rightarrow$ Short-term elasticity　　Sum of $\gamma_{t\text{-}T} \sim \gamma_t \rightarrow$ Long-term elasticity

＊ Based on FY2012 Tax Reform
- Tax rate : JPY 289/t-CO2 (Reaches over 3 and a half years)
- Revenue : 39.1 billion(FY2012) ／ 262.3 billion (FY2016-)

Analysis of Revenue Effect: Application of Technology Model

○ The AIM(Asia-Pacific Integrated Model)End-use Model, jointly-developed by the NIES and Kyoto University, is applied for analysis of revenue effect. This model is to explain about whole energy demand from combination of energy technology, and to generate concrete variation of energy consumption and emission, which are accompanied with technological change.

Structure of the AIM End-use Model



Tax for Climate Change Mitigation's Impact on Economy

○ The AIM model (the NIES) shows that the Tax for Climate Change Mitigation's impact on Japan's GDP is approximately **▲0．04%～▲0．1%**, while it is different in each step of tax increase.

Tax for Climate Change Mitigation's Economic Impact

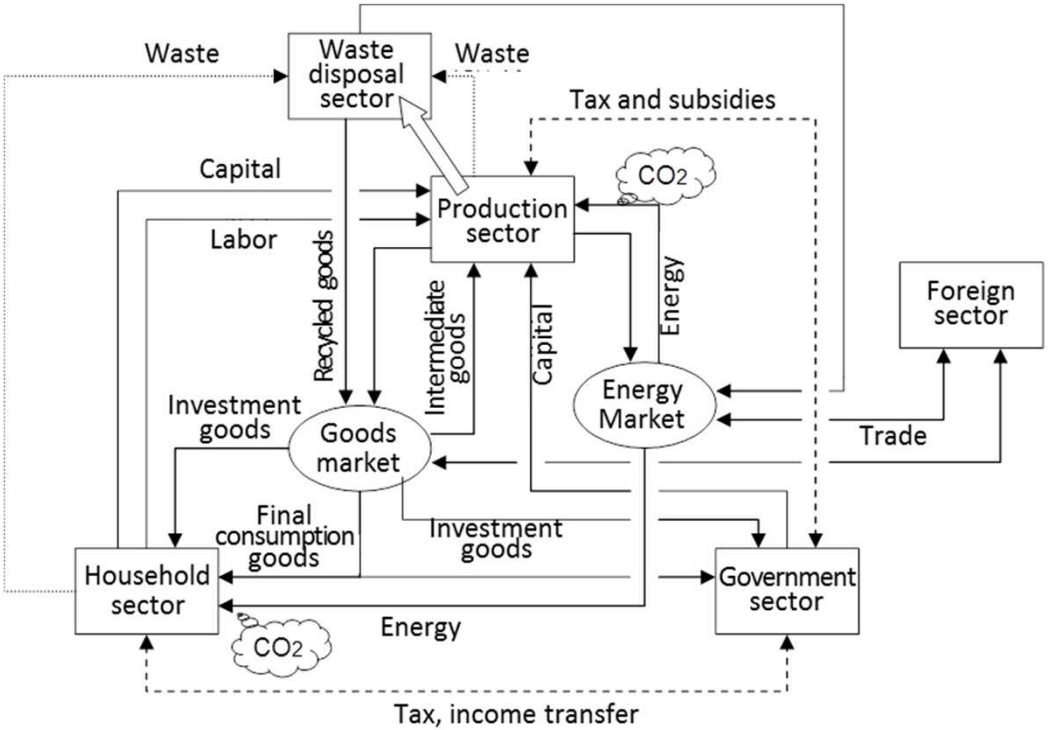
Steps of Tax Increases	Impact on GDP
1st step of increase (Oct. 2010)	▲0．04%～▲0．05%
2nd step of increase (Apr. 2014)	▲0．07%～▲0．08%
3rd step of increase (Apr. 2016)	▲0．09%～▲0．1%

＊ Based on FY2012 Tax Reform
- Tax rate ： JPY 289/t-CO2（Reaches over 3 and a half years）
- Revenue ： 39.1 billion(FY2012) ／ 262.3 billion (FY2016-)

＜Assumptions of Estimation＞
- Economic impact is estimated with the NIES AIM (Asia-Pacific Integrated Model) model.
- Based on the Conservative Case, set in the Subcommittee on Policy/Measure after 2013, Global Environment Committee, Central Environment Council
- Tax revenue is used for: (1) preferable introduction of existing technologies with better benefit to cost, (2) a half to long-term measures, and another half to distribution to existing technologies in accordance with their potential of introduction. Menu of technology is the result of the NIES AIM's technology choice model.

Economic Impact Analysis: Application of CGE Model

○ The AIM/CGE Model, developed by the NIES and Kyoto University, is applied for GWC Tax's economic impact analysis. It describes relationships among Japan's economic activity, environmental measures, and environmental burden (esp. CO2 emission) in a coordinated way.



Overview of AIM/CGE

- Applied CGE model
- Case: Japan
- Analyzed years : 2000～ 2020
- Activities : 113 goods in 109 sectors
- Regenerates both economic balance and material balance.
- Improvement of energy efficiency is acquired from the result of the AIM/End-use model.

＊ Based on FY2012 Tax Reform
- Tax rate ： JPY 289/t-CO2 (Reaches over 3 and a half years)
- Revenue ： 39.1 billion(FY2012) ／ 262.3 billion (FY2016-)

International Comparison of Carbon Taxes

International Comparison of Carbon Tax Scheme

- In major states where carbon tax is introduced, carbon tax revenue is transferred to general account, and utilized as alternative revenue source to income/corporate tax reduction.
- In many states, tax deduction/exemption for industry is introduced to alleviate the tax burden.

Carbon Tax Scheme in Major States

(As of January 2017)

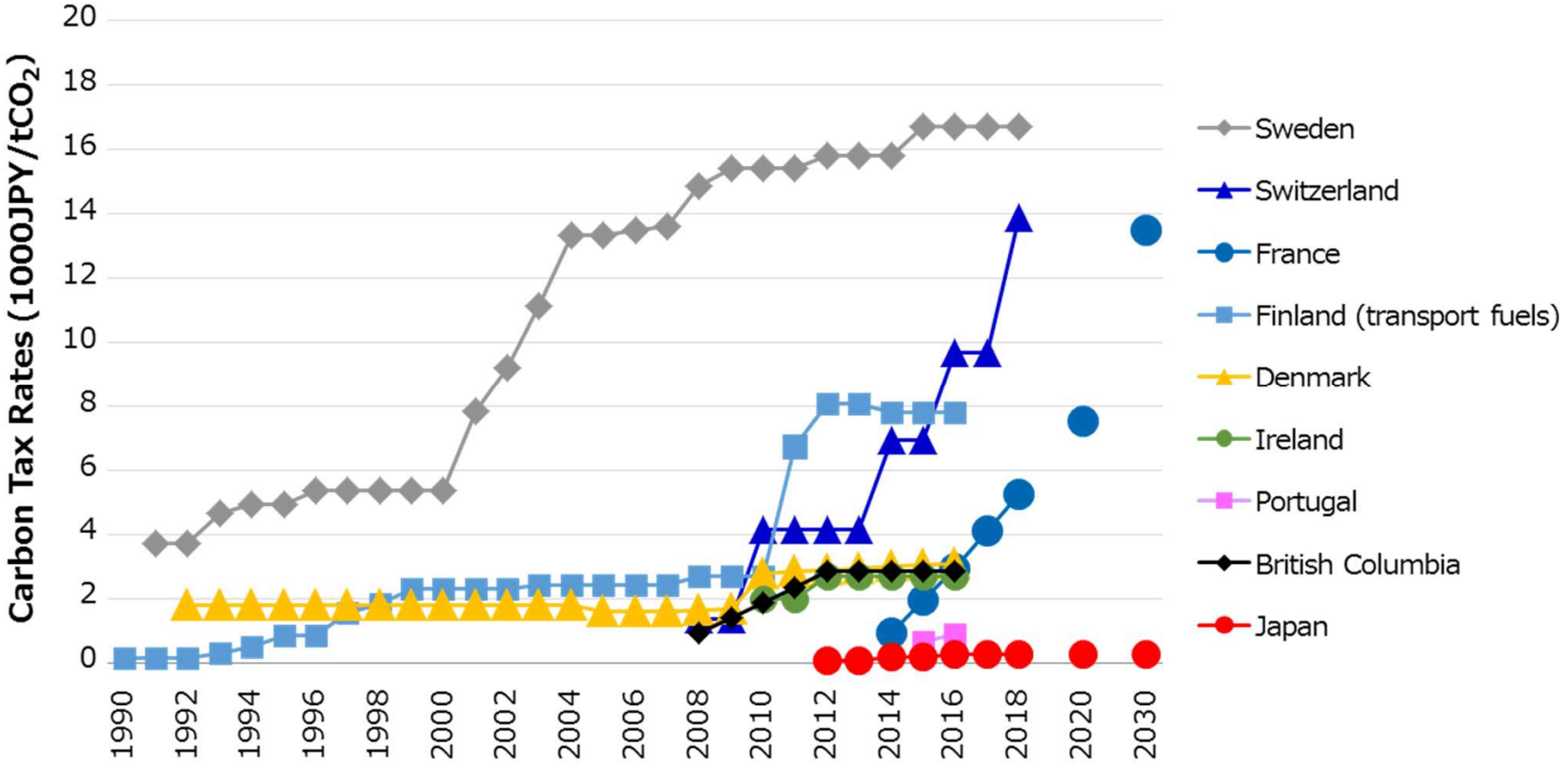
States	Start Year	Tax Rates JPY/tCO_2	Revenue JPY bill.	Transferred to:	Tax Revenue is Spent for:	Tax Deduction/Exemption
Japan (Tax for Climate Change Mitigation)	2012	289	260 [2016]	Special Account	• Control of energy-originated CO2, such as energy efficiency measures, diffusion of renewable energy, promotion of cleaner fuel	• Exempt for Naphsa for production of oil products, etc.
Finland (Carbon Tax)	1990	7,640 (58EUR) (Heat) / 8,170 (62EUR) (Transport)	162.4 [2016]	General Account	• Reduction of income tax, and support for employment-related cost of companies	• Exempt for EU-ETS installations • Deducted for industrial electricity/CHP • Tax credit for industry and agriculture
Sweden (CO_2 Tax)	1991	15,670 (119EUR) (Standard)/ 12,640 (96EUR) (Industry)	321.4 [2016]	General Account	• Reduction of corporate tax (revenue neutral)	• Exempt for EU-ETS installation/CHP • 60% deduction for industry and agriculture
Denmark (CO_2 Tax)	1992	3,050 (172.4 DKK)	65.4 [2016]	General Account	• Responded to government's fiscal demand	• Exempt for EU-ETS installations
Swiss (CO_2 Levy)	2008	9,860 (84 CHF)	97.0 [2015]	General Account & Tech Fund	• 1/3 to the retrofitting fund, and a part to technology innovation fund. 2/3 is transferred to people/companies.	• Exempt for Swiss-ETS installations • Tax deduction for companies which cleared committed reduction goal, etc.
Ireland (Carbon Tax)	2010	2,630 (20 EUR)	55.2 [2015]	General Account	• Fiscal consolidation	• Exempt for EU-ETS installations • Tax deduction for diesel for agriculture
France (Carbon Tax)	2014	4,020 (30.5 EUR)	7,902 [2016]	General Account	• A part to "Tax Credit for Encouraging Competitiveness and Jobs" as general budget	• Exempt for EU-ETS installations
Portugal (Carbon Tax)	2015	900 (6.85 EUR)	12.5 [2015]	General Account	• Reduction of income tax (projected) • A part to tax credit for EV purchase, etc.	• Exempt for EU-ETS installations
BC (CAN) (Carbon Tax)	2008	2,730 (30 CAD)	110.5 [2015]	General Account	• Reduction of other taxes (incl. corporate tax)	• Exempt for fuel used for cross-provincial transport.

(Source) Mizuho Information & Research Institute cites information of each country's government.
(Note 1) Revenue of each tax is available and the most updated one. Tax for Climate Change Mitigation's revenue is an expected amount for FY2016.
(Note 2) 1CAD=91JPY, 1CHF=117JPY, 1EUR=132JPY, 1DKK=18JPY, 1SEK=14JPY. (Average TTM from 2014 to 2016, Mizuho Bank)

International Comparison of Carbon Tax Rates and Their Trends

○ In many countries which have introduced carbon tax, its tax rate has been remarkably increased. In addition, France and Swiss have announced significant tax increases in the mid- and long-term. <u>Japan's carbon tax (Tax for Climate Change Mitigation) rate was increased in April 2016 as a final step. But it's level is lower than other countries.</u>

Trends and Future Trajectories of Carbon Tax Rates

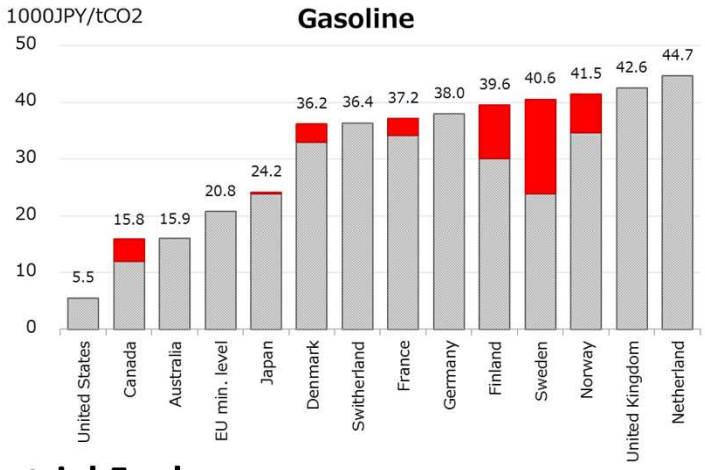


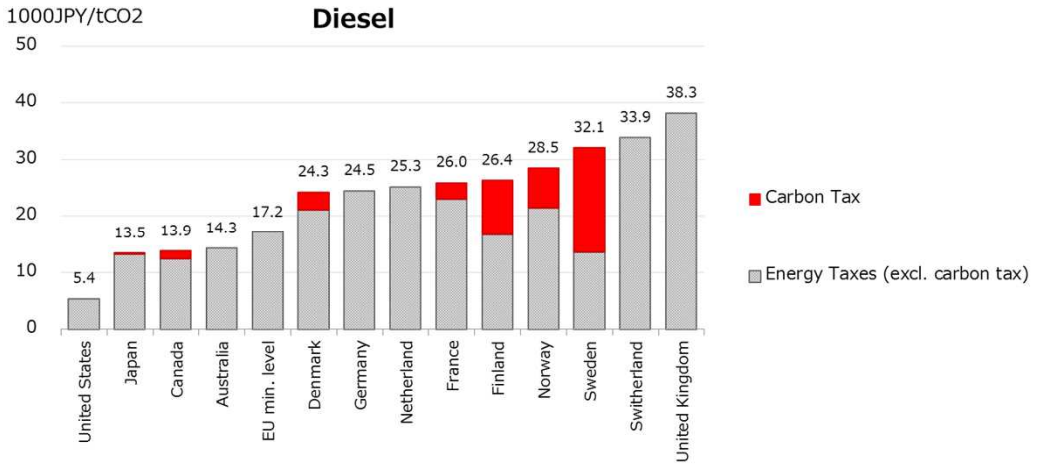
(Source) Mizuho Information & Research Institute
(Note 1) Swiss' tax rate in 2018 is the highest one ranging from 96 to 120 CHF/tCO_2.
(Note 2) 1CAD=95JPY, 1CHF=116JPY, 1EUR=135JPY, 1DKK=18JPY, 1SEK=15JPY. (Average TTM from 2013 to 2015, Mizuho Bank)

International Comparison of Energy Tax Rates

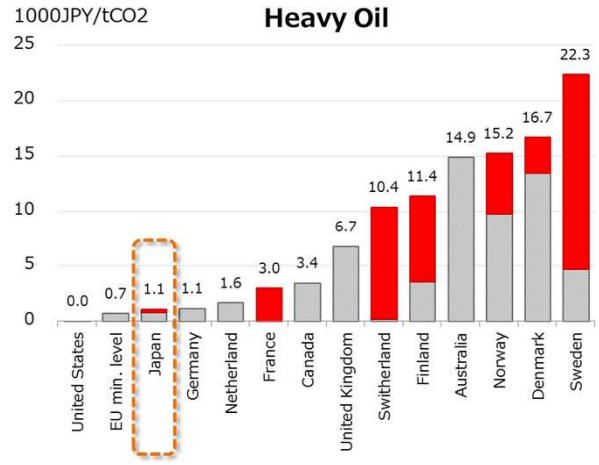
Energy Tax Rates as 1000 JPY/t-CO_2

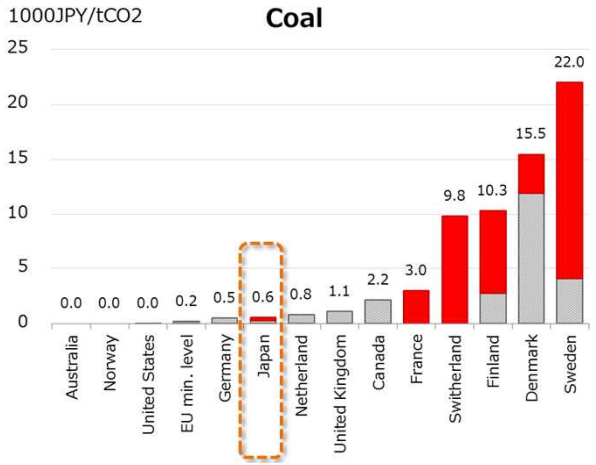
Transportation Fuels

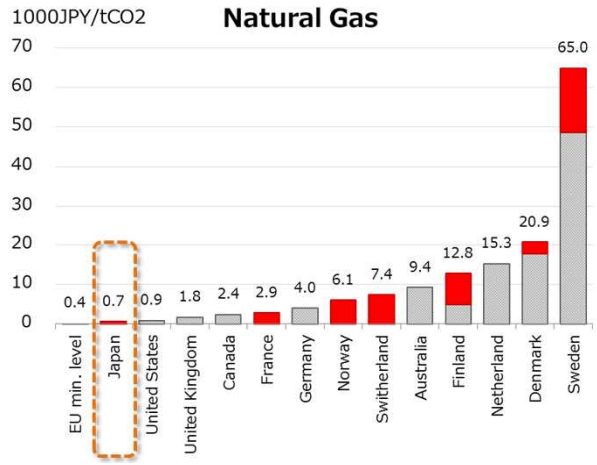




Industrial Fuels





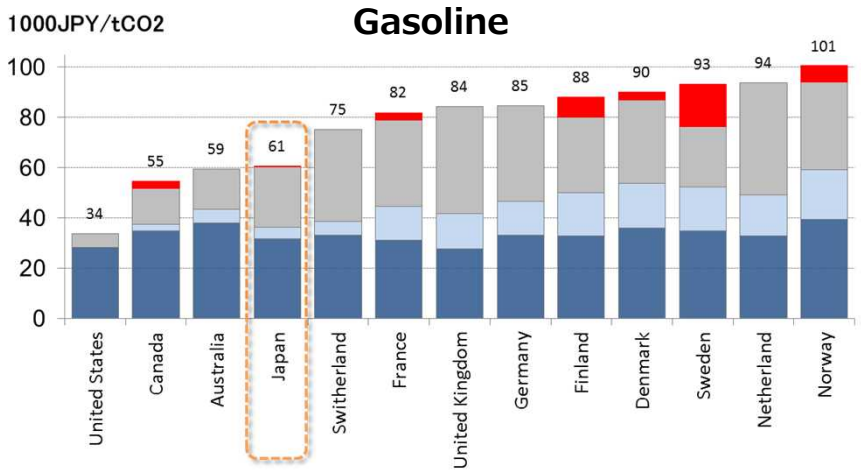


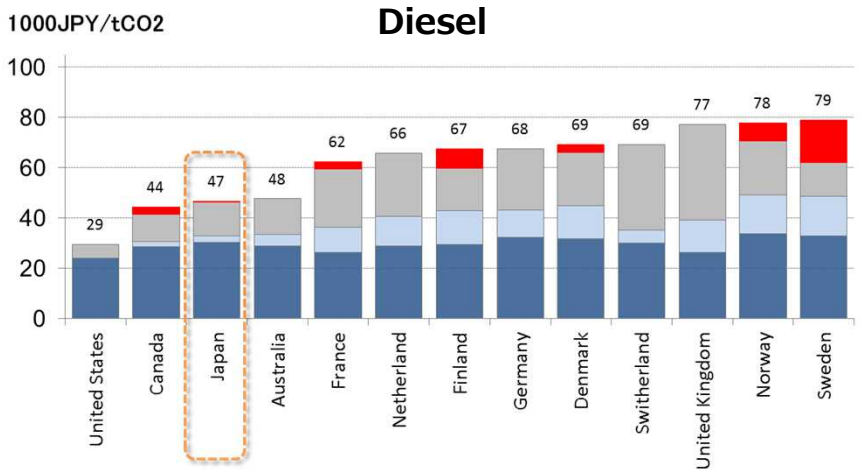
(Note 1) Tax rates are as of March 2016. (Japan's GWC Tax rate is after April 2016.)
(Note 2) Gasoline is for transport, and unleaded. Diesel is for transport. Heavy oil, coal and natural gas are for industry (heat). EU's tax floor is provided in the EU Directive (Council Directive 2003/96/EC).
(Note 3) Tax rate on Netherland's natural gas is differentiated with annual consumption and other factors.
(Note 4) Tax rates on US' gasoline and diesel include NY State Tax. Those on Canada's gasoline, diesel, heavy oil and natural gas include BC State Tax.
(Note 5) 1USD=108JPY, 1CAD=95JPY, 1AUD=94JPY, 1GBP=171JPY, 1EUR=135JPY, 1DKK=18JPY, 1SEK=15JPY, 1NDK=16JPY, 1CHF=116JPY. (Average TTM from 2013 to 2015, Mizuho Bank)
(Note 6) Each energy tax rate is converted to per t-CO2 base with METI/MOE Ordinance No. 3 (2006), "Ministry's Ordinance on Calculation of GHG Emission Accompanied with Specified Emitters' Industrial Activities".

International Comparison of Energy Price and Tax Rates

International Comparison of Energy Prices and Tax Rates per t-CO_2

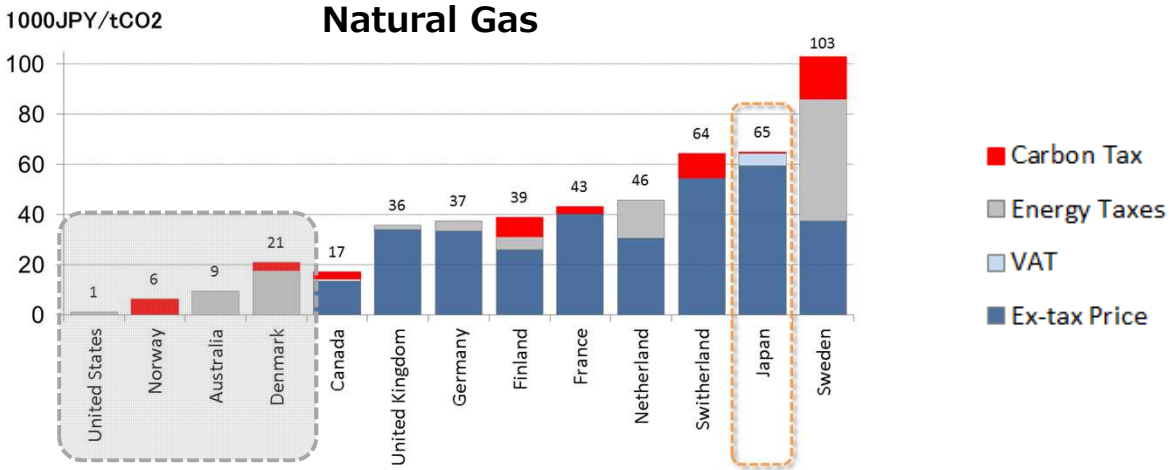
Transportation Fuels





Industrial Fuels

※Natural gas prices and VAT rates of US, Norway, Australia, and Denmark are not available. Thus this chart only shows their carbon tax rates and energy tax rates.



(Note 1) Energy price (ex-tax) and VATs (Goods and Services tax, Value Added Tax) are from IEA(2015), *Energy Prices and Taxes Quarterly Statistics, Fourth Quarter 2015.*
(Note 2) Carbon tax rates and energy tax rates are from Mizuho Information Research Institute. Tax rates are as of June 2016. As information of heavy oil and coal is limited, charts of those are not shown here.
(Note 2) Gasoline is for transport, and unleaded. Diesel is for transport. Heavy oil, coal and natural gas are for industry (heat).
(Note 3) Tax rate on Netherland's natural gas is differentiated with annual consumption and other factors.
(Note 4) Tax rates on US' gasoline and diesel include NY State Tax. Those on Canada's gasoline, diesel, heavy oil and natural gas include BC State Tax.
(Note 5) 1USD=108JPY, 1CAD=95JPY, 1AUD=94JPY, 1GBP=171JPY, 1EUR=135JPY, 1DKK=18JPY, 1SEK=15JPY, 1NDK=16JPY, 1CHF=116JPY. (Average TTM from 2013 to 2015, Mizuho Bank)
(Note 6) Each energy tax rate is converted to per t-CO2 base with METI/MOE Ordinance No. 3 (2006), "Ministry's Ordinance on Calculation of GHG Emission Accompanied with Specified Emitters' Industrial Activities".

Topics in the Future

Initiatives to Clear the 2030 GHG Emission Reduction Target

Global Warming Countermeasures Plan（Cabinet Decision, March 13, 2016）

Chapter 3　Measures and Programs to Achieve the Target

Section 2　Global Warming Countermeasures and Programs

2. Cross-sectional Measures

(f) Response towards Greening of Tax System and Effective Use of Tax for Climate Change Mitigation

Greening of environment-related tax system is an important program for global warming countermeasures, including promotion of low-carbonization. Because of that, **the government tackles to global warming countermeasures, for example, synthetic and systematic survey and analysis on environmental effect of environment-related tax system, including status and trends of other countries.**

Using tax revenue from the special tax measure of the Petroleum and Coal Tax for climate change mitigation, which has been enforced since October 2012, the government steadily implements measures to control energy-originated CO2 emission, including energy efficiency measures, diffusion of renewable energy, promotion of cleaner fuel use and more efficient use.

Experts' Proposal on 80% emission reduction by 2050

○ In February 2016, MOE's Expert Council on Long-term Strategy for Climate Change(※) published its proposals that 80% emission reduction by 2050 requires initiatives which can break the current values and common-sense, and that introduction of carbon pricing (large-scale carbon tax united with corporate tax reduction and social security reform) is effective.

※ Expert Council on Long-term Strategy for Climate Change (Chair: Takashi ONISHI, President of Science Council of Japan) was held 5 times from October 2015 to January 2016, and published its proposals on Japan's new "Strategy for Climate Change, Economy and Society."

Summary of the Council's Proposals (2016)

■ **80% emission reduction by 2050 requires initiatives which can break the current values and common-sense**

- Realization of long-term and large-scale GHG reduction needs to share the vision of such society --①Maximum reduction of energy demand;②Low-carbonization of energy; ③Promotion of electrification; -- with broad range of people.
- Realization of such a vision needs technology and "Disruptive innovation (innovation of social scheme)", which renovates whole social scheme, including social system and lifestyle.

■ **Innovation of social scheme requires supports with policy; concretely, carbon pricing which internalizes value of environment, and incentivizes improvement of carbon productivity and added-value of whole economy (e.g. large-scale carbon tax united with corporate tax reduction and social security reform).**

- Introduction of large-scale carbon pricing with price effect sufficiently influential to people's and company's action towards the 80% cut by 2050 is effective as it internalizes "value of environment" and can respond to uncertainty in the future.
- From a viewpoint that issues on climate change, economy and society are to be solved at the same time, **introduction of large-scale carbon tax, for example, united with social security reform and corporate tax reduction, is a possible option.** In this case, measures friendly to export industry can be an option, until innovation of social scheme is progressed, in order to avoid side-effects on international competitiveness.

(Source) MOE's Expert Council on Long-term Strategy for Climate Change (2016)